University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

3-28-1969

Test 1004: John Deere 1520

Follow this and additional works at: https://digitalcommons.unl.edu/tractormuseumlit

 Part of the Applied Mechanics Commons

"Test 1004: John Deere 1520" (1969). *Nebraska Tractor Tests*. 425.
https://digitalcommons.unl.edu/tractormuseumlit/425

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

NEBRASKA TRACTOR TEST 1004 – JOHN DEERE 1520 GASOLINE

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption: Gal per hr	Fuel Consumption: Lb per hp-hr	Fuel Consumption: Hp-hr per gal	Temperature Degrees F: Cooling medium	Temperature Degrees F: Air wet bulb	Temperature Degrees F: Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
47.86	2500	4.262	0.539	11.23	190	54	75	29.437
Standard Power Take-off Speed (1000 rpm)—One Hour								
43.95	2066	4.037	0.556	10.89	189	54	75	29.415
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
42.76	2627	4.035	0.571	10.60	190	54	75	.....
0.00	2750	1.874			182	54	75	.....
21.92	2698	3.143	0.868	6.97	187	54	75	.....
47.37	2501	4.228	0.540	11.20	192	54	75	.....
11.14	2740	2.518	1.368	4.42	184	55	76	.....
32.51	2665	3.609	0.672	9.01	190	54	75	.....
Av 25.95	**2663**	**3.234**	**0.754**	**8.02**	**187**	**54**	**75**	**29.400**

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption: Gal per hr	Fuel Consumption: Lb per hp-hr	Fuel Consumption: Hp-hr per gal	Temp Degrees F: Cool-ing med	Temp Degrees F: Air wet bulb	Temp Degrees F: Air bulb dry	Barom-eter inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTNON WITH BALLAST											
Maximum Available Power—Two Hours—10th Gear (5th Hi)											
37.24	2525	5.53	2483	4.73	4.135	0.672	9.01	193	47	52	28.810
75% of Pull at Maximum Power—Ten Hours—10th Gear (5th Hi)											
31.35	1939	6.06	2681	3.16	3.851	0.743	8.14	192	52	57	28.578
50% of Pull at Maximum Power—Two Hours—10th Gear (5th Hi)											
22.51	1349	6.26	2743	2.34	3.534	0.950	6.37	194	34	36	29.140
MAXIMUM POWER WITH BALLAST											
30.27	5467	2.08	2605	14.96	5th Gear (3rd Lo)			197	57	67	28.670
36.07	4854	2.79	2495	11.58	6th Gear (3rd Hi)			190	45	51	28.890
35.95	4596	2.93	2500	10.41	7th Gear (4th Lo)			191	43	50	28.890
37.88	3530	4.02	2501	7.20	8th Gear (5th Lo)			191	53	45	28.890
37.76	3441	4.11	2503	6.81	9th Gear (4th Hi)			192	42	54	28.890
38.41	2592	5.56	2500	4.88	10th Gear (5th Hi)			193	43	56	28.890
38.07	2416	5.91	2499	4.59	11th Gear (6th Lo)			194	48	56	28.890
37.62	1743	8.09	2506	3.16	12th Gear (6th Hi)			191	48	56	28.890
35.88	1506	8.93	2500	2.74	13th Gear (7th Lo)			193	48	55	28.890
34.31	1061	12.13	2499	1.94	14th Gear (7th Hi)			194	48	55	28.890
33.16	985	12.63	2502	1.76	15th Gear (8th Lo)			193	43	55	28.890
MAXIMUM PULL WITHOUT BALLAST											
28.13	4938	2.14	2664	14.73	5th Gear (3rd Lo)			189	37	40	29.160

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST
10th Gear (5th Hi)

Pounds pull	2592	2770	2985	3205	3444	3452	3336
Horsepower	38.41	36.72	35.09	32.53	29.82	24.91	19.26
Crankshaft speed rpm	2500	2246	2001	1737	1491	1243	991
Miles per hour	5.56	4.97	4.41	3.81	3.25	2.71	2.16
Slip of drivers, %	4.88	5.28	5.74	6.31	6.76	6.87	6.53

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-28; 6; 14	Two 14.9-28; 6; 14
Ballast	—Liquid	None	None
	Cast iron	417 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 4; 32	Two 6.00-16; 4; 32
Ballast	—Liquid	None	None
	Cast iron	30 lb each	None
Height of drawbar		14 inches	14½ inches
Static weight with operator—Rear		4895 lb	4060 lb
	Front	1770 lb	1710 lb
	Total	6665 lb	5770 lb

Department of Agricultural Engineering

Date of Test: March 28 to April 2, 1969

Manufacturer: JOHN DEERE DUBUQUE TRACTOR WORKS, DUBUQUE, IOWA

FUEL, OIL and TIME Fuel Regular gasoline **Octane No** Motor 85.2 Research 92.6 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.7270 **Weight per gallon** 6.052 lb **Oil** SAE 10W 30 **API service classification** MS, DG, DM **To motor** 1.673 gal **Drained from motor** 1.218 gal **Transmission and final-drive lubricant** John Deere Special 303 Oil **Total time engine was operated** 44 hours.

ENGINE Make John Deere gasoline **Type** 3 cylinder vertical **Serial No** 4MTR119050T **Crankshaft mounted** lengthwise **Rated rpm** 2500 **Bore and stroke** 4.02″ x 4.33″ **Compression ratio** 8.0 to 1 **Displacement** 164.55 cu in **Carburetor size** 1″ **Ignition system** battery **Cranking system** 12 volt electric **Lubrication** pressure **Air cleaner** dry type with replaceable pleated paper element **Oil filter** full flow replaceable pleated paper cartridge **Oil cooler** radiator for transmission and hydraulic oil **Fuel filter** screen in carburetor and fuel pump **Muffler** was used **Cooling medium temperature control** Thermostat.

CHASSIS Type standard **Serial No** T4RMH-077251T **Tread width** rear 48″ to 78″ front 48″ to 74″ **Wheel base** 80.71″ **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 25.2″ Vertical distance above roadway 26″ Horizontal distance from center of rear wheel tread 0″ to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial range operator controlled power shifting **Advertised speeds mph** first 1.46 second 2.09 third 3.11 fourth 4.34 fifth 5.75 sixth 8.22 seventh 12.20 eighth 17.05 reverse first 1.70 second 2.43 third 3.61 fourth 5.05 **Clutch** single plate dry disc in combination with PTO clutch operated by single foot pedal **Brakes** wet disc operated hydraulically by two foot pedals that can be locked together **Steering** mechanical with power assist **Turning radius** (on concrete surface with brake applied) right 114″ left 114″ (on concrete surface without brake) right 127″ left 127″ **Turning space diameter** (on concrete surface with brake applied) right 235″ left 235″ (on concrete surface without brake) right 261″ left 261″ **Belt pulley** 978 rpm at 2100 engine rpm diam 12″ face 8.5″ **Belt speed** 3074 fpm **Power take-off** 1016 rpm at 2100 engine rpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with the SAE and ASAE test code. First, second, third and fourth gears were not run as it was necessary to limit the pull in fifth gear to avoid excessive wheel slippage. Sixteenth gear was not run as it exceeded fifteen miles per hour.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1004.

L. F. LARSEN
Engineer-In-Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
D. E. LANE
Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, Director; Lincoln, Nebraska

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, ½ of the 85% torque; maximum power, ¼ and ¾ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

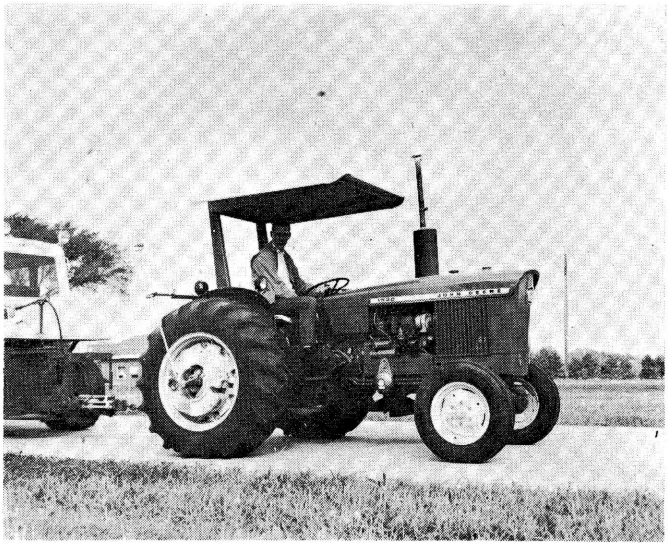
Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions: (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**



JOHN DEERE 1520 GASOLINE